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AUTHOR Williams, Floyd K.
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ABSTRACT

This learning packet, one in a group of eight, was developed by the Merchants Millpond State Park in North Carolina to teach students in grades 4-6 about the habitat and lifestyle of the beaver. Loose-leaf pages are presented in nine sections that contain: (1) introductions to the North Carolina State Parks System, the Merchants Millpond State Park, the park's activity packet, and to the beaver; (2) a summary of the activities that includes major concepts and objectives covered; (3) pre-visit activities to draw or create an imaginary animal based on a described habitat; (4) on-site activities to explore the beaver's habitat; (5) post-visit activities to demonstrate how a human would survive in a beaver's habitat; (6) a list of 18 related vocabulary words; (7) a list of 15 references; (8) necessary park and parental permission forms for the visit; and (9) blank pages for taking notes. (MDH)

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TO BEAVER

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Merchants Millpond State Park

An Environmental Education Learning Experience

Designed for Grades 4-6

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"It was the Great Spirit, with
the help of gigantic beavers,
who created the earth.
The earth had been covered
with water until the Great Spirit
sent the beavers diving down
beneath the surface to
dredge up mud from the bottom
to form the land masses."

– Cherokee Legend

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This Environmental Education Learning Experience
was developed by
Floyd K. Williams
Lead Interpretation and Education Ranger
Merchants Millpond State Park

N.C. Division of Parks and Recreation
Department of Environment, Health and Natural Resources

James B. Hunt, Jr.
Governor

Jonathan B. Howes
Secretary

Other Contributors . . .

Signa Williams, Park volunteer;

The N.C. Department of Public Instruction;

The N.C. Division of Water Resources;

The N.C. Department of Environment, Health and Natural Resources;

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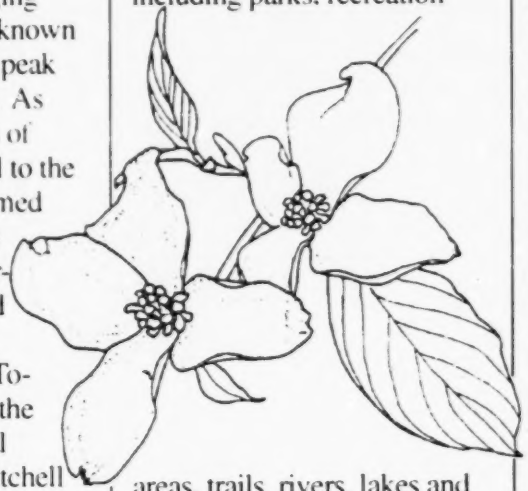
Introduction to the North Carolina State Parks System

Preserving and protecting North Carolina's natural resources is actually a relatively new idea. The seeds of the conservation movement were planted early in the 20th century when citizens were alerted to the devastation of Mount Mitchell. Logging was destroying a well-known landmark - the highest peak east of the Mississippi. As the magnificent forests of this mile-high peak fell to the lumbermen's axe, alarmed citizens began to voice their opposition. Governor Locke Craig joined them in their efforts to save Mount Mitchell. Together they convinced the legislature to pass a bill establishing Mount Mitchell as the first state park.

That was in 1915. The North Carolina State Parks System has now been established for more than three-quarters of a century. What started out as one small plot of public land has grown into 59 properties across the state, including parks, recreation



areas, trails, rivers, lakes and natural areas. This vast network of land boasts some of the most beautiful scenery in the world and offers endless recreation opportunities. But our state parks system offers much more than scenery and recreation. Our lands and waters contain unique and valuable archaeological, geological and biological resources that are important parts of our natural heritage.

As one of North Carolina's principal conservation agencies, the Division of Parks and Recreation is responsible for the more than 125,000 acres that make up our state parks system. The Division manages these resources for the safe enjoyment of the public and protects and preserves them as a part of the heritage we will pass on to generations to come.

An important component of our stewardship of these lands is education. Through our interpretation and environmental education services, the Division of Parks and Recreation strives to offer enlightening programs which lead to an understanding and appreciation of our natural resources. The goal of our environmental education program is to generate an awareness in all individuals which cultivates responsible stewardship of the earth.

For more information contact:

NC Division of Parks and Recreation
P.O. Box 27687
Raleigh, NC 27611-7687
919/ 733-4181

Introduction to Merchants Millpond State Park

Merchants Millpond State Park lies on the headwaters of Bennetts Creek near the geographical center of Gates County. The park may be reached by US 158 or 32 and is situated approximately 30 miles west of Elizabeth City.

In 1811, a millpond was constructed on Bennetts Creek. A grist mill was built to grind corn and wheat and a saw mill to cut lumber. Through the years the mill had many owners. By the turn of the century, the mill was the biggest in Gates County and became the chief trade center of the region. It soon became known as "Merchants Millpond."

While the mill was important for business, it also became known as a place to socialize. A post office called "Merchants Mill" was in operation until 1915. The mill closed, however, shortly before World War II. The last owner of the millpond, Mr. A.B. Coleman, donated the millpond and some adjacent land to the Division of Parks and Recreation in June 1973 for the establishment of a park.

The natural resources of this unique coastal plain pond and swamp offer numerous recreation and education opportunities, making a trip to Merchants Millpond both exciting and rewarding. The most prominent feature of the park is the millpond itself. Dominated by cypress and tupelo gum, the black waters of the pond support a magnificent and diverse plant community as well as provide habitat for numerous animal species. Here visitors can observe the intricate interdependence of the members of this natural ecosystem. Whether paddling a canoe over the still waters of the 760 acre pond or walking along one of the park's 9 1/2 miles of trails, the park visitor can enjoy a unique outdoor experience.

Program Options

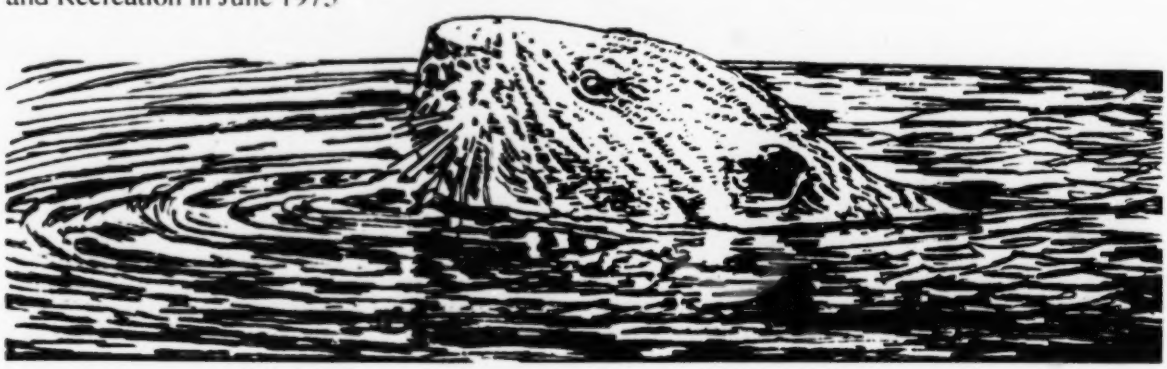
Environmental education programs are available by reservation. Programs are developed for different grade levels and include such topics as plant and animal adaptations, birds, insects, pond and swamp ecology, astronomy and local cultural history. Programs on these and other topics can be adapted to meet special requests. Groups are also welcome to visit the park for self-guided expeditions.

Scheduling a Trip

To make a reservation, complete a copy of the scheduling worksheet in the activity packet. Provide the information to the park at least two weeks in advance of your arrival.

Before You Make The Trip

1. Visit the park without the participants prior to the scheduled group trip. This will give you a chance to become familiar with facilities and park staff, and provide you the opportunity to identify potential problems.



2. Discuss behavior expectations with adult leaders and participants when planning the trip. Discuss the park rules listed. Emphasize safety.

3. Inform the group that contact with numerous ticks can be expected throughout the spring, summer and early fall. Discuss the need to use insect repellent during these times. Poison ivy, chiggers and biting flies should be discussed also.

4. Inform your group of the need to dress appropriately for the season. Walking shoes are suggested for all seasons. The weather can be very hot and humid from late spring through early fall. Sunscreen and hats are advised.

5. Have everyone wear a name tag. For safety, please color-code them (for groups) and establish a buddy system.

6. Group leaders are responsible for obtaining a consent form from each participant including a listing of any health considerations and medical needs. These forms are available in the activity packet.

7. If your group plans to collect any plants, animals or minerals within the park, a Research Activity Permit is required. Contact the park to obtain a permit application.

8. If you will be late or need to cancel your trip, please notify the park as far ahead as possible.

While At The Park

Please obey the following rules:

1. To help you get the most out of the experience and increase the chance of observing wildlife, be as quiet as possible while in the park.

2. On hikes, walk behind the leader at all times. Stay on the trails. Running is not permitted.

3. All plants and animals within the park are protected. Breaking plants and harming animals is prohibited in all state parks. This allows future visitors the same opportunity to enjoy our natural resources.

4. Picnic in designated picnic areas only. Help keep the park clean and natural; do not litter.

5. Swimming is not permitted in the park.

6. Any programs being carried out by park staff in canoes require a float plan which specifies safety precautions and requirements for the trip. Also, please stay away from the spillway while in canoes.

7. In case of accident or emergency, contact park staff immediately.

Following The Trip

1. Complete post-visit activity in the Environmental Education Learning Experience packet.

2. Build upon the field experience and encourage participants to seek answers to questions and problems encountered at the park.

3. Relate the experience to classroom activities and curriculum through reports, projects, demonstrations, displays and presentations.

4. Give tests or evaluations, if appropriate, to determine if students have gained the desired information from the experience.

5. File a written evaluation of the experience with the park. Evaluation forms are available in the activity packet.

Park Information :

Merchants Millpond State Park
Route 1, Box 141-A
Gatesville, NC 27938
Phone (919) 357-1191

Hours of Operation:

Nov-Feb	8:00 - 6:00 p.m.
Mar, Oct	8:00 - 7:00 p.m.
Apr, May, Sep	8:00 - 8:00 p.m.
Jun, Jul, Aug	8:00 - 9:00 p.m.

Introduction to the Activity Packet for Merchants Millpond State Park

The environmental education learning experience "Leave It To Beaver" was developed to provide environmental education through a series of hands-on activities for the classroom and the outdoor setting of Merchants Millpond State Park. This activity packet is designed for grades 4 to 6; however, it can be adapted to other grade levels. The activity packet meets curriculum objectives of the standard course of study established by the North Carolina Department of Public Instruction as listed with each activity. It includes three types of activities: pre-visit, on-site and post-visit. The on-site activity will be conducted at the park, while pre-visit and post-visit activities are designed for the classroom. These activities may be performed independently or in a series to build upon students' newly gained knowledge and experience. In the future, other activities will be produced to expand the activity packet.

The environmental education learning experience "Leave It To Beaver" will expose students to the following major concepts:

- **Animal adaptations**
- **Animal habitats**
- **Human adaptations**
- **Animal sign**
- **Observation skills**

Vocabulary words used throughout the environmental education learning experience appear in **bold** type the first time they are used in each activity. These words are defined in the vocabulary list at the back of the activity packet. A list of the reference materials used in developing the activities follows the vocabulary list.

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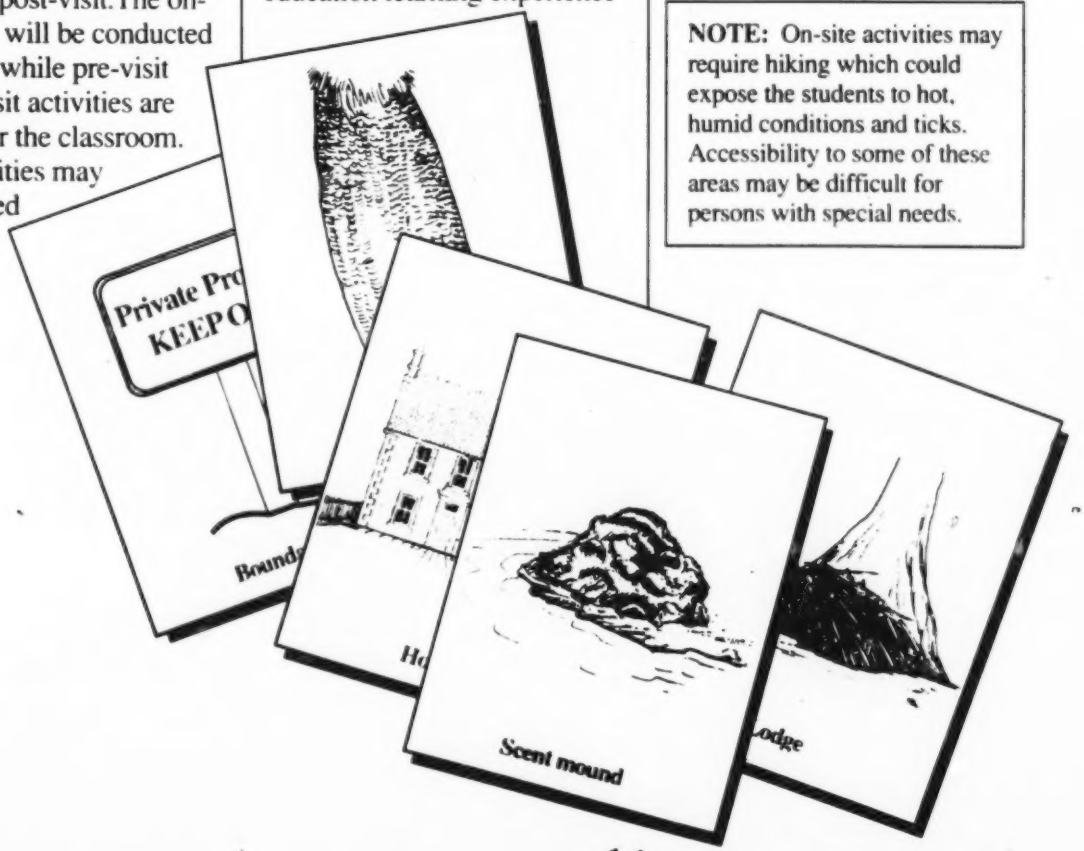
NOTE: On-site activities may require hiking which could expose the students to hot, humid conditions and ticks. Accessibility to some of these areas may be difficult for persons with special needs.



Introduction to the Beaver

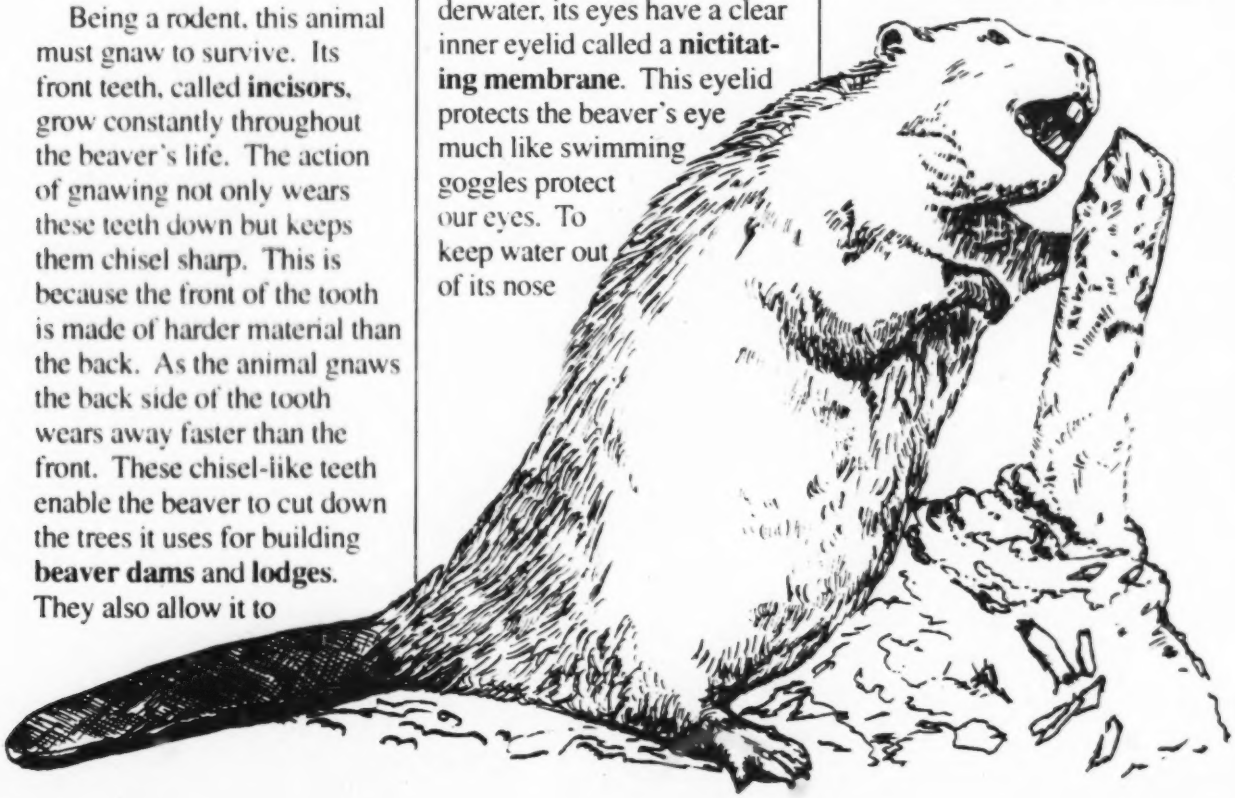
The beaver is one of the most easily recognized mammals. Its characteristic teeth and tail are familiar to almost everyone and its habit of cutting down trees is legendary. There are many misconceptions about this amazing animal and many of its habits and **adaptations** are misunderstood.

The beaver is a **rodent**, related to such animals as the squirrel and the mouse. In fact, it is the second largest rodent in the world. Beavers in North Carolina reach an average adult weight of 35 to 45 pounds, while beavers in more northern areas may weigh up to 100 pounds.

Being a rodent, this animal must gnaw to survive. Its front teeth, called **incisors**, grow constantly throughout the beaver's life. The action of gnawing not only wears these teeth down but keeps them chisel sharp. This is because the front of the tooth is made of harder material than the back. As the animal gnaws the back side of the tooth wears away faster than the front. These chisel-like teeth enable the beaver to cut down the trees it uses for building **beaver dams** and **lodges**. They also allow it to reach the **cambium**, a thin layer of softer materials just under the bark of trees, that the beaver uses as food. With its sharp teeth and strong jaw muscles, a beaver is able to cut down a five inch thick tree in just about three minutes.

This creature has some remarkable adaptations for living in its **habitat**. Because it is an **aquatic animal**, the beaver must be a good swimmer. Its body is shaped like a bullet so that it can move through the water easily. The large webbed hind feet propel it to speeds up to six miles per hour. Because the beaver has large lungs, it can hold its breath for up to 15 minutes. To help it see underwater, its eyes have a clear inner eyelid called a **nictitating membrane**. This eyelid protects the beaver's eye much like swimming goggles protect our eyes. To keep water out of its nose and ears, the beaver has special folds of skin that close when it is underwater. A beaver can even chew underwater because its mouth has a split lip that close behind the incisors. Of course, one of the most visible adaptations is the beaver's tail. It is broad and flat and is used to help steer while swimming, similar to the way a rudder helps to steer a boat. It is important for the beaver to keep its fur well groomed and free of twigs and other debris. Two of the claws on the inner side of each hind foot are split. The beaver uses these like combs to groom its fur.

Some of the adaptations for swimming also help the beaver



in other ways. The tail can be used as a prop when the beaver is gnawing down trees. When slapped against the water, it is a very effective warning device to alert other beavers of danger.

The front legs of the beaver are small and have hand-like paws which it uses to hold its food while eating, as well as to dig with. When a beaver swims, it holds its front legs against its body and uses its strong teeth and jaws to carry branches and tree trunks to its lodge or dam. The front legs are also used to build the **scent mounds** the beaver uses to identify its territory. A scent mound is made by pushing up mud and leaves onto the banks of streams or shores of ponds. Once the mound is made, the beaver turns around and releases **castoreum,** from castor glands, onto the mound. The castoreum has a very strong odor and each beaver has its own special scent. Only beavers from the same family are allowed to stay in the area, or **territory**, marked by the scent mounds. Territories are very important. Each beaver family must have a certain amount of territory in which to live and gather food.

The lifestyle of beavers can be compared in some ways to that of humans. Beavers build homes called lodges where the "family" lives. Adult beavers are monogamous, the male and female stay together for life. Only if one of the couple dies will the other look for another mate. The pair usually has two to four kits each spring. The kits stay with their parents until they are at least two years old. This means that each family unit has at least two generations of youngsters. Beavers live to be about 12 to 15 years old.

Beavers are well known as builders. They cut down trees to build lodges and dams. The dams serve to back up water to form a pond where the beavers can build a lodge that will be safe from large **predators**. This is similar to what people of long ago did when they built moats around castles for protection from enemies. The pond also serves to create an underwater storage area for the beaver's winter **food cache**, or supply, as well as a safe haven in case of danger. These ponds also create a habitat for many other creatures. Ducks, fish and other animals often benefit from the beaver's work. Humans have even started to use beavers in some areas as a natural way to help control soil erosion and harmful runoff and to provide watering basins for livestock and irrigation reservoirs.

Unfortunately, beavers sometimes choose to build their dams in places people find inconvenient. Beavers that build dams across streams on farmland sometimes cause fields to flood, killing the farmer's crops or drowning out valuable timber. Beavers have also been known to flood low lying roads.

The beaver has played an important role in the history of North America. Native Americans used the beaver as a source of food and clothing. When Europeans began to settle in North America, the beaver pelt became an important unit of trade with the Native Americans. Beaver fur was so sought after by the settlers that beavers were eventually trapped out of the east, or **extirpated**, and the trappers had to move west to find more beavers. As a result, trading posts were established on the frontier. Some of these trading posts eventually became cities. The Lewis and Clark Expedition of 1804 setout, in part, to search out new areas for fur trapping.

In North Carolina, the beavers were trapped out by about 1900. In 1938 some beavers from Pennsylvania were brought to North Carolina. More beavers were brought in, or stocked, in 1959. Laws were created to protect the beavers and slowly the population grew. Today, it is not unusual to see beavers, or at least the signs of their activities, along many of the state's waterways.

13 **scent mound**

Activity Summary

The following outline provides a brief summary of each activity, the major concepts introduced and the objectives met by completion of the activity.

I. Pre-Visit Activity

#1 Creature Creations (page 3.1.1)

Students will create a creature with adaptations to fit a described habitat. Then students will learn about beaver adaptations.

Major concepts:

- Animal adaptations
- Animal habitats

Objectives:

- Define adaptation and explain why adaptations are important.
- Describe at least three adaptations which allow an animal to live within a habitat.
- Describe a beaver and list four of its adaptations to its habitat.

II. On-Site Activity

#1 Which Way to the Beaver? (page 4.1.1)

Students will explore the beaver habitat in search of tell-tale evidence of their presence. They will compile data for later discussions.

Major Concepts:

- Animal sign
- Adaptation
- Habitat
- Observation skills

Objectives:

- Define animal sign.
- List four types of beaver sign.
- Describe how beaver sign show the use of adaptations.
- List two components of habitat that can be related to beaver sign.

III. Post-Visit Activity

#1 Beaver Cleaver Gone Wild (page 5.1.1)

Students will demonstrate how a human would survive in a beaver's habitat through the use of human adaptations and also with devices they may need to acquire their basic needs.

Major concepts:

- Animal adaptations
- Human adaptations
- Habitats

Objectives:

- Describe how humans use tools and devices to adapt to a habitat.
- Demonstrate an understanding of beaver adaptations and how these adaptations help a beaver cope with its environment.
- Discuss five beaver adaptations and human similarities to them.

Pre-Visit Activity #1 — Creature Creations

Curriculum Objectives:

Grade 4

- Arts Education: develop positive attitudes about self, others and the arts
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency for interacting with others
- Science: living things – animals, adaptation to environment
- Social Studies: gather, organize and analyze information, draw conclusions, participate effectively in groups

Grade 5

- Arts Education: develop positive attitudes about self, others and the arts
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency for interacting with others
- Science: environment
- Social Studies: gather, organize and analyze information, draw conclusions, participate effectively in groups

Grade 6

- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency and skill for interacting with others
- Science: ecology
- Social Studies: gather, organize and analyze information, draw conclusions

Location: Classroom

Group Size: Class size

Estimated Time: 45 minutes

Materials:
Provided by the educator:
Per group: Large drawing paper, construction paper, crayons, modeling clay, tape, glue, box of odds-n-ends (popsicle sticks, pieces of cloth, beans, feathers, toothpicks, string, paper clips, spoons, bottlecaps, etc.), "Creature Creation" worksheet, "Beaver Adaptation" worksheet

Major Concepts:

- Animal adaptations
- Animal habitats

Objectives:

- Define adaptation and explain why adaptations are important.
- Describe at least three adaptations which allow an animal to live within a habitat.
- Describe a beaver and list four of its adaptations to its habitat.

Educator's Information:

In this activity students will work in groups to create an imaginary animal and show how its **adaptations** help it live in its habitat. Students will then complete the "Beaver Adaptation" worksheet.

When we say a living thing is adapted to its way of life we mean it is well suited to live in a particular type of place. The place it lives is called its **habitat**. The basic components of a habitat are food, water, shelter and space or **territory**.

Adaptations help a living thing survive and reproduce within its habitat. Adaptations may be physical, such as a beaver's webbed hind feet; or they may be behavioral, such as the beaver's **crepuscular** habits. Adaptations may also be "physiological", that is they may be special body functions. An example of a physiological adaptation would be the way the beaver's circulatory system reacts when the animal dives into the water. Its heart rate slows down and blood is directed to its most important organs.

Instructions:

1. Discuss adaptations. Make sure everyone knows what an adaptation is. Note: do not use the beaver as an example.

2. Divide the class into groups of 4 or 5 students.

3. Tell each group that they are to create their own imaginary "creature" and its habitat by using the information given on the "Creature Creation" worksheet. Emphasize that they should use their imaginations and their creation cannot be an actual known animal. Suggest that their creature could be extraterrestrial, robotic, mutant or any imaginary animal. Give the students 20 minutes to complete their creation.

4. When they have finished, have the groups describe their creation's adaptations and habitat. Have them explain how these adaptations give their creature an advantage in obtaining its needed habitat components.

5. After each group has shared their creation, ask the students if they can think of an animal in this area that could be described by the adaptations listed on the worksheet. Now give a short introduction to the beaver and its adaptations.

6. Have the students complete the "Beaver Adaptation" worksheet by filling in the blanks.

Creature Creation Worksheet

Student's Information:

All animals have **adaptations**. An adaptation is a change that has developed in an animal's body structure or in the way it acquires life's necessities which allow it to survive in its environment. Examples of adaptations are camouflage for concealment, webbed feet for swimming, thick fur for warmth, keen vision to find food or seeing enemies, etc. These adaptations help the animal obtain the basic components of its **habitat**. These components are food, water, shelter or safety, and adequate space or **territory**.

Instructions:

Create your own imaginary creature using its adaptations in its habitat with the materials supplied. It can be a drawing, clay model, collage, etc. Your creature must have at least three of the abilities described. For help in understanding each of these adaptations, see the listed examples.

After you have "created" your creature, be prepared to explain to the rest of the class what your creatures adaptations are and how those adaptations help your creature gain what it needs from its habitat.

Abilities

1. This creature swims under water long distances.
examples:

- Salmon – migrates thousands of miles
- Porpoise – feeds underwater, large lungs allow them to stay underwater for long periods of time

2. This creature lives in water and on land.
examples:

- Wood Duck – feeds on land and in water, walks and swims
- Frog – feeds on land and in water, lays eggs in water
- Otter – feeds in water, rests and grooms on land
- Alligator – feeds on land and in water, lays eggs on land

3. This creature is more comfortable swimming than walking.
examples:

- Turtle – short legs, webbed feet or flippers
- Seal – flippers instead of legs

4. This creature stays warm in the coldest weather.
examples:

- Polar Bear – hollow hair in fur for insulation, black skin to absorb heat
- Whale – blubber (fat) layer for insulation

5. This creature works at night and stays home in the day.
examples:

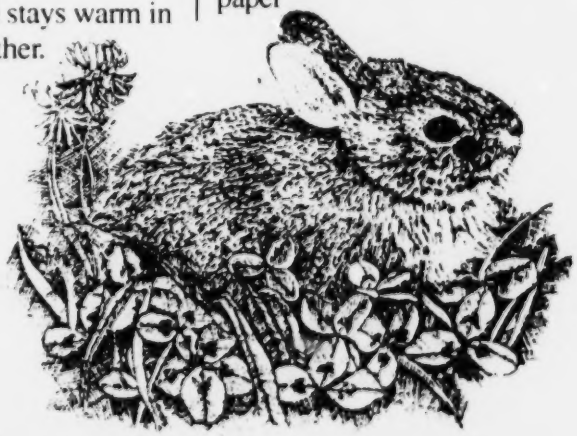
- Owl – dark, coloration for camouflage, good hearing and sight for night hunting
- Cat – mottled coloration for camouflage, good hearing, sight and sense of smell

6. This creature eats many different parts of plants.
examples:

- Deer – eats grass, seeds, leaves twigs
- Rabbit – eats grass, stems

7. This creature builds its own home.
examples:

- Squirrel – builds a nest by using feet and mouth
- Woodpecker – constructs holes in trees by using beak and neck muscles
- Wasp – builds a paper nest by chewing wood to make paper



Beaver Adaptation Worksheet

Describe how these adaptations help the beaver live in its environment. Write your answer in the space provided.

Bullet shaped body - _____

Tail - _____

Webbed hind feet - _____

Split toenail - _____

Oil gland - _____

Castor gland - _____

Hand-like front feet - _____

Incisors - _____

Split lip and cheek flaps - _____

Nose with flaps - _____

Eyes with nictitating membranes - _____

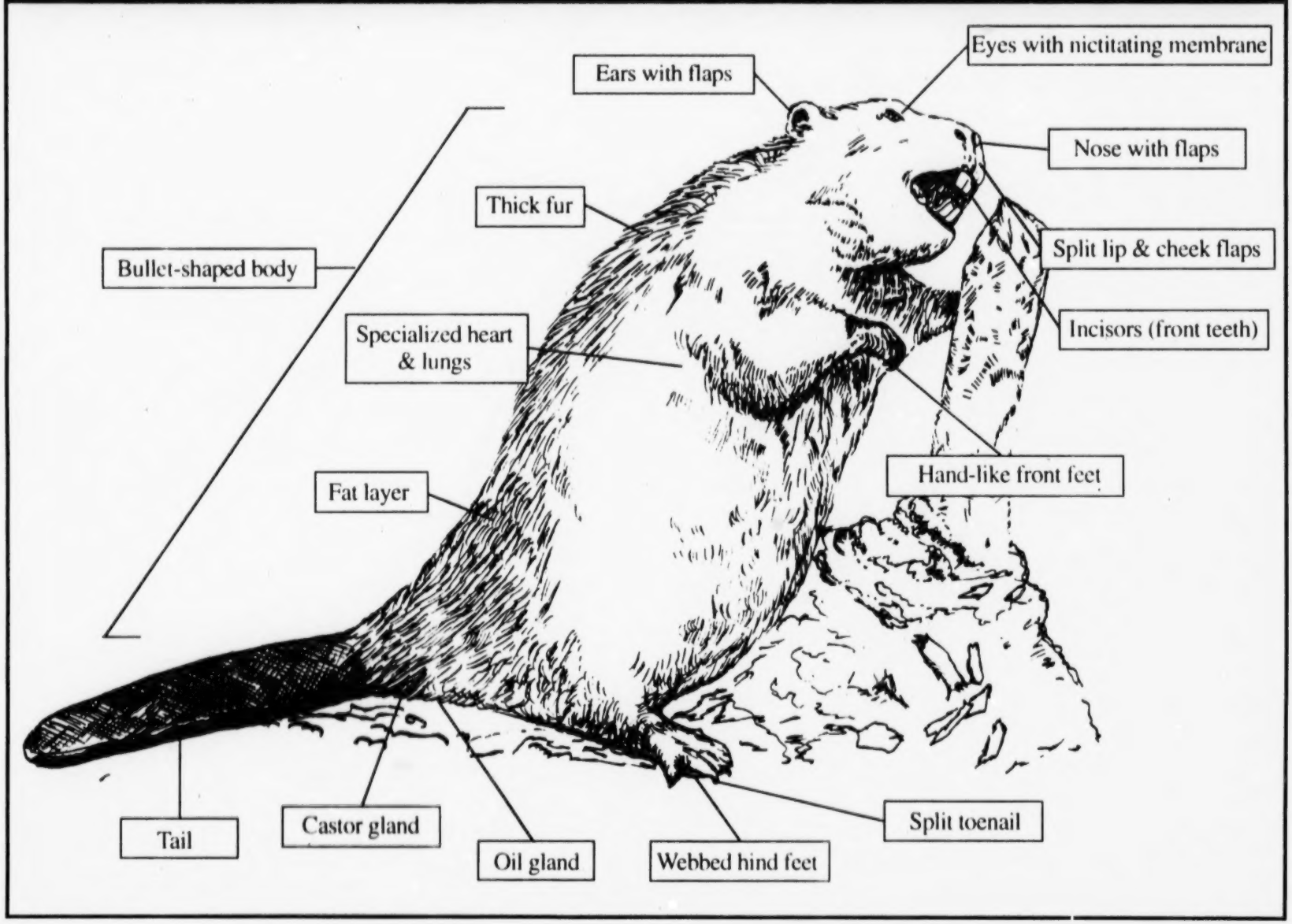
Ears with flaps - _____

Thick fur - _____

Fat layer - _____

Specialized heart and lungs - _____

Beaver Adaptations



Beaver Adaptation Answer Sheet

Describe how these adaptations help the beaver live in its environment. Write your answer in the space provided.

Bullet shaped body - **helps to swim efficiently**

Tail - **used as rudder for swimming; prop for sitting; warning device by slapping on water**

Webbed hind feet - **help to swim efficiently; platform for standing**

Split toenail - **used as a comb to groom, spreads oil on fur for waterproofing**

Oil gland - **used as waterproofing for fur, dry fur helps act as insulation**

Castor gland - **produces castoreum used to mark territory**

Hand-like front feet - **used to hold onto trees and limbs while cutting and eating; used to dig, for lodge and dam construction; carry mud, construct scent mounds, push limbs into mud for winter food supply**

Incisors - **used to cut trees and limbs for construction and food; cutting with the incisors keeps them sharp**

Split lip and cheek flaps - **used to keep wood chips out of the mouth while cutting trees, keeps water out while gnawing underwater**

Nose with flaps - **provides good sense of smell to detect enemies, unfamiliar beaver and favorite trees for food; flap keeps water out while swimming**

Eyes with nictitating membranes - **used underwater to protect eyes**

Ears with flaps - **provide good hearing for protection; flaps keep water out while swimming**

Thick fur - **used as insulation, camouflage; dark color helps to absorb heat**

Fat layer - **used as insulation in winter and as an emergency energy source**

Specialized heart and lungs - **help to stay underwater for long periods of time; to work or escape**

On-Site Activity #1 Which Way To The Beaver?

Curriculum Objectives:

Grade 4
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency for interacting with others
- Science: living things – animals, adaptation to environment
- Social Studies: gather, organize and analyze information, draw conclusions, participate effectively in groups

Grade 5
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency for interacting with others
- Science: environment
- Social Studies: gather, organize and analyze information, draw conclusions, participate effectively in groups

Grade 6
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency and skill for interacting with others
- Science: ecology
- Social Studies: gather, organize and analyze information, draw conclusions

Location: Cypress Point Trail

Group Size: 30 or less

Estimated Time:
45 to 60 minutes

Appropriate Season:
Fall through mid-spring

Materials:
Provided by the educator:
"Beaver Log" worksheets, "Beaver Adaptation" worksheet from Pre-Visit Activity #1, pencils, clipboards

Special Considerations:
Ticks may be encountered in the fall, spring and summer. Extra supervision may be necessary due to the proximity to the water of the Millpond.

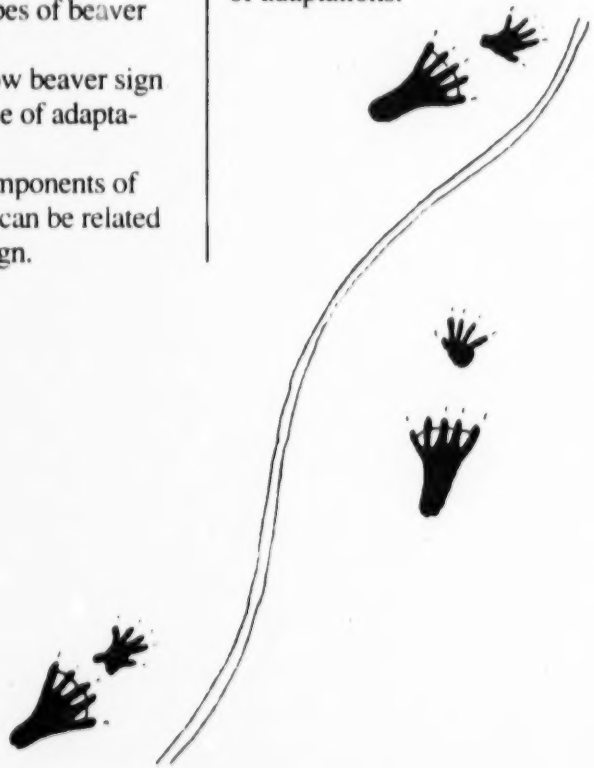
Major Concepts:
- Animal sign
- Adaptation
- Habitat
- Observation skills

Objectives:
- Define animal sign.
- List four types of beaver sign.
- Describe how beaver sign show the use of adaptations.
- List two components of habitat that can be related to beaver sign.

Educator's Information:

It is recommended the Pre-Visit "Beaver Adaptation" worksheet be completed prior to starting this activity. Each student should bring a completed copy.

In this activity the students will work in small groups to locate beaver sign. They'll determine the adaptations the beaver used to "make" the sign and what habitat components, if any, might be represented by that sign. The students will then share their discoveries with the rest of the class. The activity concludes with a discussion of the major concepts, emphasizing the importance of adaptations.



Instructions:

1. Divide the class into four groups and give them copies of the "Beaver Log" worksheets, their completed "Beaver Adaptation" worksheet and a clipboard.

2. Assign each group to a plot of land previously marked by park staff. Tell the students that each plot will have at least two obvious types of beaver sign present and that their plot includes all land area within the markers plus all parts of the millpond that are visible.

3. Tell the students that for each sign they find, they'll need to think of at least two adaptations which the beaver used to make the sign. Suggest they use their "Beaver Adaptations" worksheet to help with this. Tell them to also list any habitat components (i.e., food, water, shelter, territory) which may be represented by the sign. Explain to the students that the location of certain beaver sign might give more clues to the adaptations used. You might want to use the following example: a cut tree or cut limbs. On land, this sign could indicate the use of the incisors to chew, back feet to stand on, front feet to hold the limb, the tail for a prop, dark color for camouflage and a keen sense of smell to find the favored trees to cut. In the water, this sign could indicate the use of the adaptations which allow the beaver to move the limb through the water such as the nictitating membranes, ear and nose flaps, split lip, bullet-shaped body, large lungs, fur, fat layer and oil glands, along with the aforementioned adaptations. Finally, assure the students that some of the adaptations used by the beaver will be obvious and that many answers are acceptable.

4. Allow the groups 10 to 15 minutes to make their observations and list their findings.

5. At the end of this time, gather the groups together and, as a class, visit each plot. At each plot have the students who were assigned that plot describe what they found there. Then ask the other students if they can add anything to the group's report.

6. After each plot has been visited and described, lead a class discussion about the findings to reinforce the major concepts, emphasizing the importance of adaptations.

Beaver lodge

Student's Information

All animals live in a **habitat**. Their habitat contains what they need for food, water, shelter and **territory**. In their habitats they leave behind evidence or clues of their presence and activities. We refer to these clues as **animal sign**. Many questions about animals can be answered by sign, such as what animal made it, what it was doing, where it was going and what special **adaptations** it used to create it.

Sign can take many forms. Tracks, bits of fur, left-over food items, smells and sounds are examples of sign. Sign of some animals can be very hard to find and may be difficult to distinguish, while other animals leave sign that are unmistakable.

Beaver leave some clues to their activities which are very conspicuous or obvious. These include cut trees and limbs, wood chips, **scent mounds**, **beaver dams** and ponds and **lodges**. Some beaver clues that are harder to find or distinguish are tracks, **food caches**, scat (droppings), tail drags, tree drags, burrows, dug **canals** or **channels**, cut non-woody plants, bits of fur, sounds (splashing of tail on water or mooing) and smells given off by **castoreum** on scent mounds. All of these clues help indicate "Which Way to the Beaver".

Beaver dam

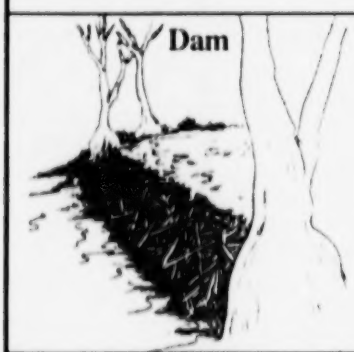
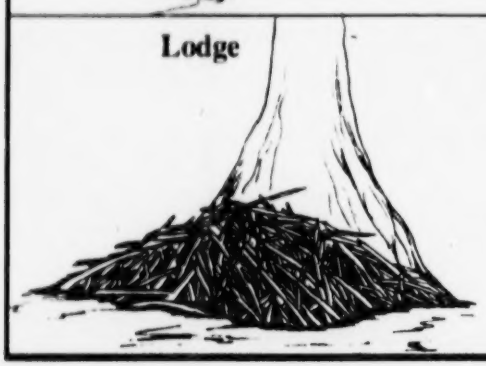
Beaver Log Worksheet

Place a check by each sign found in your plot. List at least two adaptations used to make the sign and how they are used. List the habitat components met by using this adaptation.

Sign	Possible Adaptations Used (note how it is used)	Habitat Components (food, water, shelter, territory)
Cut trees or limbs		
Wood chips		
Tracks		
Food cache		

Beaver Log Worksheet

Place a check by each sign found in your plot. List at least two adaptations used to make the sign and how they are used. List the habitat components met by using this adaptation.

Sign	Possible Adaptations Used (note how it is used)	Habitat Components (food, water, shelter, territory)
Cut limb in water		
Scent mound		
Dam 		
Lodge 		

Beaver Log Worksheet

Place a check by each sign found in your plot. List at least two adaptations used to make the sign and how they are used. List the habitat components met by using this adaptation.

Sign	Possible Adaptations Used (note how it is used)	Habitat Components (food, water, shelter, territory)
Tree drags		
Canal or Channel		
Cut non-woody plants		
Bits of fur		
Splashing of tail		
Mooing sounds		
Scat		

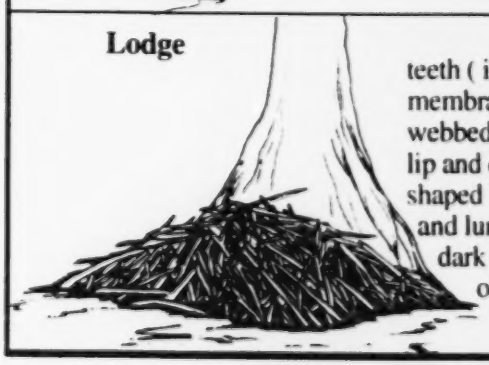
Beaver Log Worksheet – Possible Answers

Place a check by each sign found in your plot. List at least two adaptations used to make the sign and how they are used. List the habitat components met by using this adaptation.

Sign	Possible Adaptations Used (note how it is used)	Habitat Components (food, water, shelter, territory)
Cut trees or limbs	teeth (incisors), webbed hind feet, front feet, tail, sense of smell, dark color	food, water
Wood chips	teeth (incisors), split lip and cheek flaps	food, shelter
Tracks	webbed hind feet, dark color, front feet	territory
Food cache	teeth (incisors), nictitating membranes, ear flaps, nose flaps, webbed hind feet, front feet, split lip and cheek flaps, tail, bullet-shaped body, specialized heart and lungs, thick fur and fat layer, dark color, family structure, oil glands	food, shelter

Beaver Log Worksheet – Possible Answers

Place a check by each sign found in your plot. List at least two adaptations used to make the sign and how they are used. List the habitat components met by using this adaptation.

Sign	Possible Adaptations Used (note how it is used)	Habitat Components (food, water, shelter, territory)
Cut limb in water	teeth (incisors), nictitating membranes, ear flaps, nose flaps, webbed hind feet, front feet, split lip and cheek flaps, tail, bullet-shaped body, specialized heart and lungs, thick fur and fat layer, oil glands	food, shelter
Scent mound	webbed hind feet, front feet, sense of smell, dark color, castor gland, family structure	territory
Dam	teeth (incisors), nictitating membranes, ear flaps, nose flaps, webbed hind feet, front feet, split lip and cheek flaps, tail, bullet-shaped body, specialized heart and lungs, sense of hearing, thick fur and fat layer, dark color, family structure, oil glands	food, water, shelter, territory
Lodge 	teeth (incisors), nictitating membranes, ear flaps, nose flaps, webbed hind feet, front feet, split lip and cheek flaps, tail, bullet-shaped body, specialized heart and lungs, thick fur and fat layer, dark color, family structure, oil glands	food, water, shelter, territory

Beaver Log Worksheet – Possible Answers

Place a check by each sign found in your plot. List at least two adaptations used to make the sign and how they are used. List the habitat components met by using this adaptation.

Sign	Possible Adaptations Used (note how it is used)	Habitat Component (food, water, shelter, territory)
Tree drags	teeth (incisors), webbed hind feet, dark color	food, shelter
Canal or Channel	teeth (incisors), nictitating membranes, ear flaps, nose flaps, webbed hind feet, front feet, split lip and cheek flaps, tail, bullet-shaped body, specialized heart and lungs, thick fur and fat layer, dark color, family structure, oil glands	food, water, shelter
Cut non-woody plants	teeth (incisors), front feet, sense of smell	food
Bits of fur	thick fur and fat layer, split toenail, oil glands	
Splashing of tail	tail, sense of smell, sense of hearing, family structure	shelter
Mooing sounds	family structure, sense of hearing	shelter
Scat	teeth (incisors), split lip and cheek flaps	food

Post-Visit Activity #1 Beaver Cleaver Gone Wild

Curriculum Objectives:

Grade 4
- Arts Education: develop positive attitudes about self, others and the arts
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency for interacting with others
- Science: living things – animals, adaptation to environment
- Social Studies: gather, organize and analyze information, draw conclusions, participate effectively in groups

Grade 5
- Arts Education: develop positive attitudes about self, others and the arts
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency for interacting with others
- Science: environment
- Social Studies: gather, organize and analyze information, draw conclusions, participate effectively in groups

Grade 6
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: competency and skill for interacting with others
- Science: ecology
- Social Studies: gather, organize and analyze information, draw conclusions

Location: Classroom

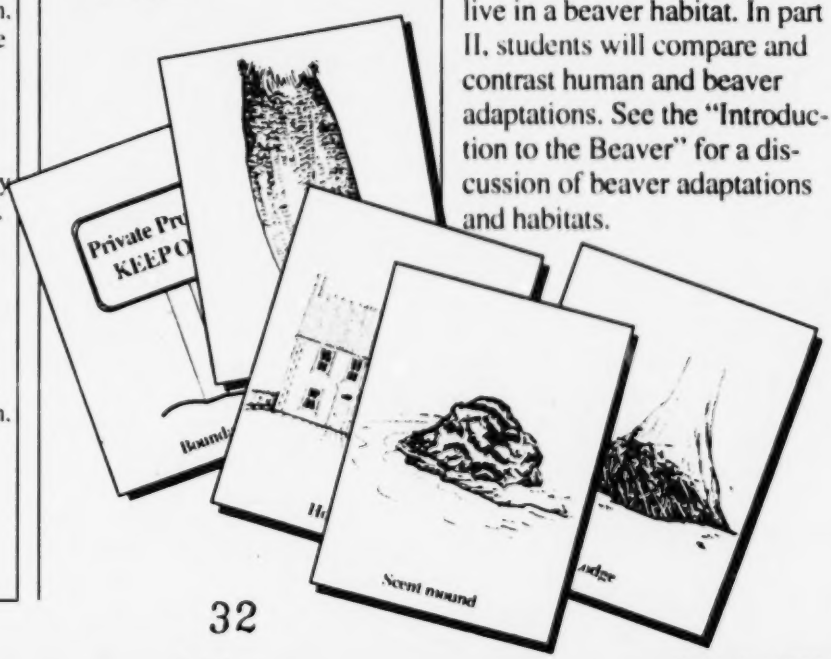
Group Size: Class

Estimated Time: 45 minutes

Materials:
Provided by the educator:
Per group: large sheet of drawing paper, pencils, crayons, a set of "Mix and Match Adaptation Cards"

Major Concepts:
- Animal adaptations
- Human adaptations
- Habitats

Objectives:
- Describe how humans use tools and devices to adapt to a habitat.
- Demonstrate an understanding of beaver adaptations and how these adaptations help a beaver cope with its environment.
- Discuss five beaver adaptations and human similarities to them.



Educator's Information:

It is recommended that this activity be preceded by the Pre-Visit Activity "Creature Creations" and On-Site Activity "Which Way To The Beaver?"

All animals have certain adaptations which allow them to live successfully within their environments. Humans are unique in their ability to adapt to a wide range of environments through the use of tools and devices. While some animals, beaver for example, may grow heavy coats of fur and develop thick layers of fat to enable them to cope with living in a cold climate, human beings rely on such things as specialized clothing and heating systems.

In part I of this activity, the students determine the adaptations necessary for people to live in a beaver habitat. In part II, students will compare and contrast human and beaver adaptations. See the "Introduction to the Beaver" for a discussion of beaver adaptations and habitats.

Instructions:

Part I.

1. Discuss the concept of adaptations and habitats with the class. In particular, relate to them how the beaver copes with meeting its needs for food, shelter and territory.

2. Divide the class into groups and provide each group with drawing paper, pencils and crayons. Tell them to draw pictures of things or actions that would enable a person to live in a typical beaver habitat. They should make sure that their person has adequate shelter, a means of obtaining food and some way to mark the boundaries of his/her territory. They will also need to consider proper clothing.

3. Remind students to recall the sign of beaver activity within the habitat they observed at Merchants Millpond State Park. Encourage them to include beaver sign in their drawings and presentation.

4. Set a time limit for them to complete their pictures. They may wish to list some things that may be too difficult or time consuming to draw.

5. When time is up, have a spokesperson for each group explain their drawings.

6. As a class discuss:

a. What are the similarities and differences between human adaptations and the adaptations of other animals?

- Similarities: animals and people need protected homes, safe places to find food and water, and beavers and humans both manipulate their habitats.

- Differences: animal adaptations to an environment are mostly physical and behavioral. For example, beaver fur, claws and chewing incisors are physical adaptations; being crepuscular is behavioral. Human adaptations make it possible to create what is needed by invention and manufacture of such things as clothing, shelter and transportation and development of agriculture.

b. Are humans always successful in exploiting new environments? (No, not permanently, but attempts have been made and continue to be made to inhabit space, the oceans depths and the polar regions.)

c. If an environment changes suddenly, what happens to the animals living there? (They adapt with behavioral changes, leave or die. Physical adaptations take many generations to appear.)

d. Are adaptations developed quickly or do they take a long time? (Behavioral adaptations can occur rather quickly, physical adaptations may take many generations to appear.)

Part II.

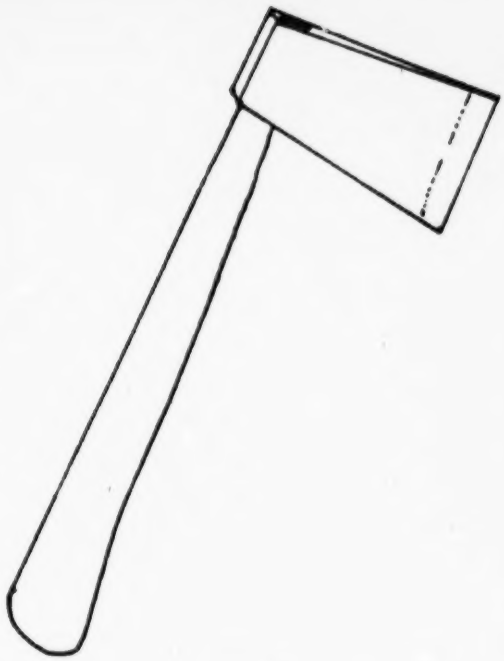
1. Provide each group of students with a set of "Mix & Match Adaptation Cards".

2. Have them match the 10 beaver adaptations to the human ones.

3. When all groups are done, discuss each of the matches emphasizing the beaver-human comparisons and contrasts.

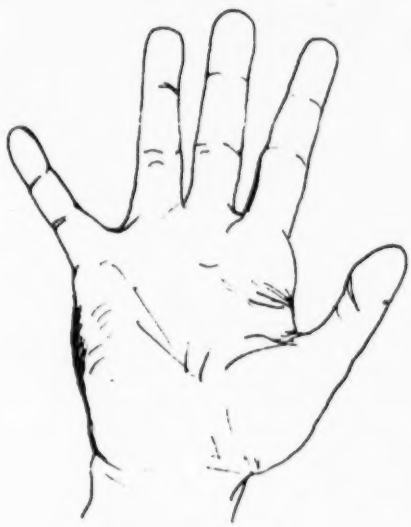
Mix & Match Adaptation Cards

Teeth



Axe

Front foot



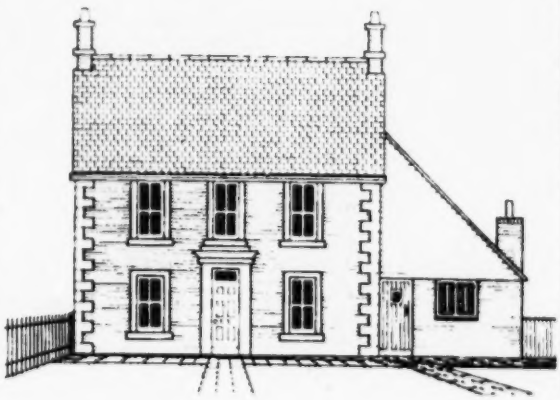
Hand

Mix & Match Adaptation Cards

Split toenail

Comb

Lodge



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House

Mix & Match Adaptation Cards

Cut trees and limbs

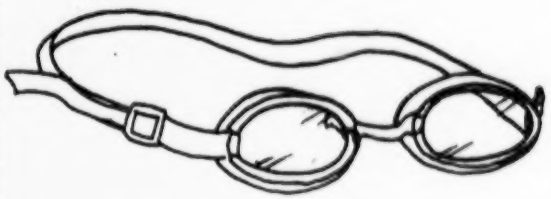
Food

Scent mound

Boundary line

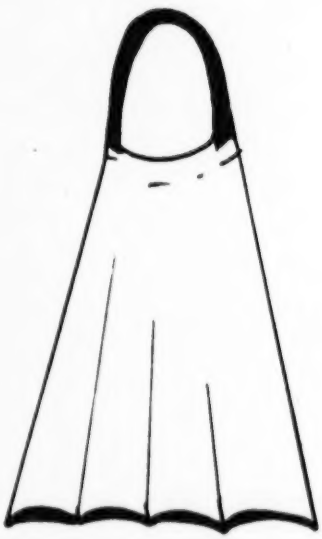
Mix & Match Adaptation Cards

Eye with nictitating membrane



Goggles

Webbed hind foot

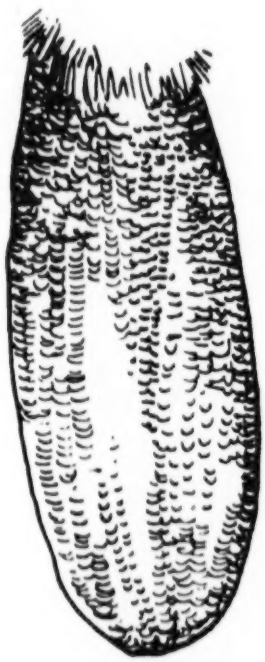


Swim fin

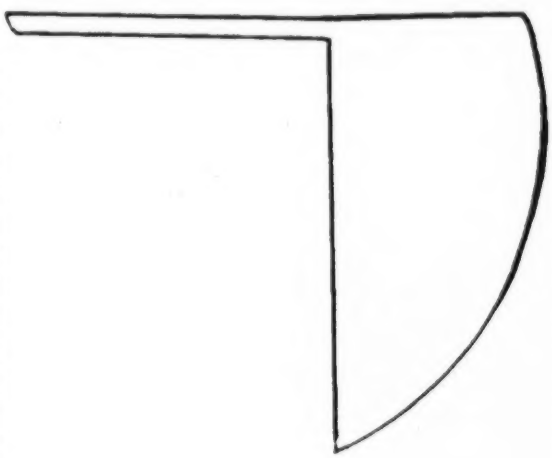
Mix & Match Adaptation Cards

Big lungs

Oxygen



Tail



Boat rudder

VOCABULARY

Adaptation – A change in the structure or function of an animal that allows it to better adjust to its environment.

Animal sign – An indicator of the presence of an animal. Tracks, droppings, scent markings, etc., are all examples of sign.

Aquatic animal – An animal living in a water environment.

Beaver dam – A structure made of sticksand mud built by beavers to stop flowing water, creating a beaver pond.

Cambium – The thin, soft growth layer found beneath the bark of trees.

Castoreum – A strong smelling, oily liquid released by special glands located at the base of a beaver's tail.

Channel, canal – A ditch the beaver digs to transport food and building materials to the main beaver pond.

Crepuscular – Active at dawn and dusk. Nocturnal animals are active at night. Diurnal animals are active during the day.

Extirpated species – A species which has been exterminated or driven out of a certain area but that still exists elsewhere.

Food cache – A stockpile of food hidden away by an animal.

Habitat – The place where a plant or animal is normally found.

Incisors – Front teeth used for cutting.

Lodge – A shelter made of sticks and mud constructed by the beaver.

Nictitating membrane – The inner eyelid that protects some animals' eyes when the outer lids are open.

Predator – An organism which consumes another living organism.

Rodent – Any of a group of mammals which are characterized by large incisors adapted for gnawing and nibbling. Mice, squirrels, beavers and porcupines are all rodents.

Scent mound – A pile of mud and leaves upon which a beaver releases castoreum in order to mark a territory.

Territory – An area an animal considers its home range. It will defend this area against other animals of the same species and drive them out.

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Park files, Merchants Millpond State Park, Route 1, Box 141-A, Gatesville, NC 27938

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SCHEDULING WORKSHEET

Date request received_____ Request received by_____

1) Name of group (school) _____

2) Contact person _____ _____
name phone (work) (home)

_____
address

3) Day/date/time of requested program _____

4) Program desired and program length _____

5) Meeting place _____

6) Time of arrival at park _____ Time of departure from park _____

7) Number of students _____ Age range (grade) _____

8) Number of chaperones _____

9) Areas of special emphasis _____

10) Special considerations of group (e.g. allergies, health concerns, physical limitations)_____
_____

11) Have you or your group participated in park programs before? If yes, please indicate previous programs attended: _____
_____
If no, mail the contact person an Educator's Guide.

12) Are parental permission forms required? _____ If yes do you have these forms? _____
If not, mail contact person a Parental Permission form.

I, _____, have read the entire Environmental Education Learning Experience and understand and agree to all the conditions within it.

Return to: Merchants Milpond State Park
Route 1, Box 141-A
Gatesville, NC 27938

PARENTAL PERMISSION FORM

Dear Parent:

Your child will soon be involved in an exciting learning adventure - an environmental education experience at _____. Studies have shown that such "hands-on" learning programs improve children's attitudes and performance in a broad range of school subjects.

In order to make your child's visit to "nature's classroom" as safe as possible we ask that you provide the following information and sign at the bottom. Please note that insects, poison ivy and other potential risks are a natural part of any outdoor setting. We advise that children bring appropriate clothing (long pants, rain gear, sturdy shoes) for their planned activities.

Child's name _____

Does your child:

- Have an allergy to bee stings or insect bites?_____
  If so, please have them bring their medication and stress that they, or the group leader, be able to administer it.

- Have other allergies? _____

- Have any other health problems we should be aware of?_____
  _____

- In case of an emergency, I give permission for my child to be treated by the attending physician. I understand that I would be notified as soon as possible.

_____ _____
Parent's signature date

Parent's name _____ Home phone _____
(please print) Work phone _____

Family Physician's name _____ phone _____

Alternate Emergency Contact

Name_____ phone _____

NORTH CAROLINA PARKS & RECREATION
PROGRAM EVALUATION

Please take a few moments to evaluate the program(s) you received. This will help us improve our service to you in the future.

1. Program title(s) _____ Date _____
   Program leader(s) _____

2. What part of the program(s) did you find the most interesting and useful? _____
   _____

3. What part(s) did you find the least interesting and useful? _____
   _____

4. What can we do to improve the program(s)? _____
   _____
   _____

5. General comments _____
   _____
   _____
   _____

LEADERS OF SCHOOL GROUPS AND OTHER ORGANIZED YOUTH GROUPS
PLEASE ANSWER THESE ADDITIONAL QUESTIONS:

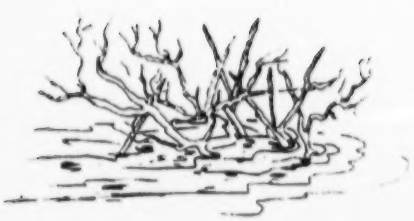
6. Group (school) name _____

7. Did the program(s) meet the stated objectives or curriculum needs? _____
   If not, why? _____
   _____

Please return the completed form to park staff. Thank you.

Merchants Millpond State Park
Route 1, Box 141-A
Gatesville, NC 27938

Notes



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